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We claim:

- 5 1. A process for preparing polyoxymethylene by contacting a formaldehyde source with a catalyst of the formula I



10 where

M is Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh or Ir,

15 Cp is a cyclopentadienyl ligand  $\text{C}_5\text{H}_{(5-u)}\text{R}^1_u$ , where

u is from 0 to 5 and

20  $\text{R}^1$  is alkyl, alkenyl, aryl, heteroaryl, aralkyl,  $\text{COOR}^2$ ,  $\text{COR}^2$ , CN or  $\text{NO}_2$ , and

$\text{R}^2$  is H, alkyl, aryl or aralkyl,

25 v is 1 or 2,

each L is independently a nitrile, CO or a ligand displaceable by CO,

w is an integer from 0 to 4,

30 Z is an anion, and

m and n are each independently an integer from 1 to 3.

- 35 2. A process as claimed in claim 1 where

Cp is a cyclopentadienyl ligand  $\text{C}_5\text{H}_{(5-u)}\text{R}^1_u$ , where

40  $\text{R}^1$  is methyl, CHO,  $\text{COCH}_3$ ,  $\text{COC}_2\text{H}_5$ ,  $\text{COOCH}_3$ ,  $\text{COOC}_2\text{H}_5$ , CN or  $\text{NO}_2$ .

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3. A process as claimed in any of the preceding claims where M is Mo or W.

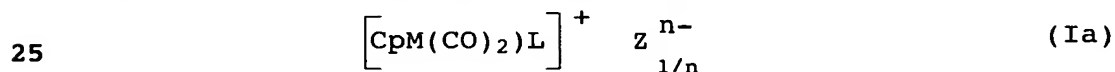
5 4. A process as claimed in any of the preceding claims where each L is selected independently from nitriles, CO, alkenes, phosphines, amines, ethers, carboxylic esters, cyclic carbonic esters, epoxides, hemiacetals, acetals and nitro compounds.

10 5. A process as claimed in any of the preceding claims where Z is a halide, sulfonate of the formula  $\text{OSO}_2\text{R}$ , where R is alkyl, partially or fully halogenated alkyl or aryl, carboxylate, complexed borate, complexed phosphate, complexed arsenate or complexed antimonate.

15 6. A process as claimed in claim 5 where Z is chloride, acetate, trifluoroacetate or trifluoromethanesulfonate.

20 7. A process as claimed in any of the preceding claims where the formaldehyde source is formaldehyde, trioxane or paraformaldehyde.

8. A catalyst of the formula Ia



where

M is Mo or W,

30 Cp is a cyclopentadienyl ligand  $\text{C}_5\text{H}_4\text{R}^1$  or  $\text{C}_5\text{H}_3\text{R}^1_2$ , where  $\text{R}^1$  is CHO,  $\text{COCH}_3$ ,  $\text{COOCH}_3$  or  $\text{COOC}_2\text{H}_5$ ,

L is CO or  $\text{CH}_3\text{CN}$ ,

35 Z is an anion and

n is an integer from 1 to 3.

40 9. A catalyst as claimed in claim 8 where

Cp is a cyclopentadienyl ligand  $\text{C}_5\text{H}_4\text{R}^1$  where  $\text{R}^1$  is CHO,  $\text{COCH}_3$  or  $\text{COOCH}_3$  or is a cyclopentadienyl ligand  $\text{C}_5\text{H}_3\text{R}^1_2$  where  $\text{R}^1$  is  $\text{COOC}_2\text{H}_5$ .

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10. A catalyst as claimed in claim 8 or 9 where Z is trifluoromethanesulfonate, trifluoroacetate, tetrafluoroborate, hexafluorophosphate or hexafluoroantimonate.

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